

3.2 – Solving Problems by Solving Equations

Curriculum Outcomes	Related Activities	Page in Text
<ul style="list-style-type: none"> • apply properties of numbers when operating upon expressions and equations • model (with concrete materials and pictorial representations and express the relationships between arithmetic operations and operations on algebraic expressions and equations • interpret solutions to equations based on context 	<p>Investigation and Focuses to have students explore and develop a process by which they can:</p> <ul style="list-style-type: none"> • solve an equation of the form $ax + b = c$ • interpret the solution to an equation in the form $ax + b = c$ to ensure it is reasonable in the original problem 	<p>104 108</p>

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Solving an Equation:

- Requires finding the value of the variable that makes the equation true
- Finding a good representation or model is often the key to solving a problem
- Occurs when a problem involves a relationship that can be written algebraically (with variables)

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Steps to Solving Equations:

1. Isolate the variable on one side of the equation.

* if needed:

- Remove brackets by using the distributive property
- When using fractions, multiply by the LCM

2. Divide both sides by the coefficient (multiplier of the variables).

3. Simplify where possible.

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(12.) $18 - 2x = 6x - 14$

$+2x \quad +2x$

$18 = 8x - 14$

$+14 \quad +14$

$32 = 8x$

$\frac{32}{8} = \frac{8x}{8}$

$x = 4$

$3x^2 + 2y^2 + 9xy + 5x + 22$

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Example 1:

Steps to Solving Equations With One Unknown	Example 1: $8 + 6x = 50$
1) Isolate the term with the variable on one side of the equation. Where applicable: <ul style="list-style-type: none"> remove brackets using the distributive property multiply by the LCM and simplify fractions 	1) $8 + 6x = 50$ $\xrightarrow{-8}$ $6x = 50 - 8$ $6x = 42$
2) Divide both sides by the coefficient multiplied by the variable.	2) $\frac{6x}{6} = \frac{42}{6}$
3) Simplify where possible.	3) $x = \frac{42}{6}$ $x = 7$

$$\begin{array}{r}
 8 + 6x = 50 \\
 -8 \quad -8 \\
 \hline
 6x = 42 \\
 \div 6 \quad \div 6 \\
 \hline
 x = 7
 \end{array}$$

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How to verify your answer:

Example 1:
 $8 + 6x = 50$

Answer--> $x = 7$

Left side	Right side
$8 + 6x$	50
$8 + 6(7)$	
$8 + 42$	
50	

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Example 2:

Steps to Solving Equations With One Unknown	Example 2: $8(g - 3) = -25$
1) Isolate the term with the variable on one side of the equation. Where applicable: <ul style="list-style-type: none"> remove brackets using the distributive property multiply by the LCM and simplify fractions 	1) $8(g - 3) = -25$ $8g + (8)(-3) = -25$ $8g - 24 = -25$ $\quad \quad \quad \xrightarrow{+24}$ $8g = -25 + 24$ $8g = -1$
2) Divide both sides by the coefficient multiplied by the variable.	2) $\frac{8g}{8} = \frac{-1}{8}$
3) Simplify where possible.	3) $\frac{8g}{8} = \frac{-1}{8}$ $g = \frac{-1}{8}$

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$$\begin{aligned}
 & \underline{-2(3y-7)} = 56 \\
 & -6y + 14 = 56 \\
 & \quad \quad \quad -14 \quad -14 \\
 & \underline{-6y = 42} \\
 & \quad \quad \quad -6 \quad -6 \\
 & \quad \quad \quad y = -7 \\
 \\
 & \text{j) } 13x + 7(-3x-1) = -63 \\
 & \underline{13x - 21x - 7} = -63 \\
 & \underline{-8x - 7} = -63 \\
 & \quad \quad \quad +7 \quad +7 \\
 & \underline{-8x = -56} \quad x = +7 \\
 & \quad \quad \quad -8 \quad -8
 \end{aligned}$$

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How to verify your answer:

Example 2:

$$8(g - 3) = -25$$

Answer--> $x = \frac{-1}{8}$

Left side	Right side
$8(g - 3)$	-25
$8(-1/8 - 3)$	
$-8/8 - 24$	
$-1 - 24$	
-25	

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Today:

- Finish and pass in Friday's worksheet
- Watch Solving equation video
(you may work on your worksheet silently)
- Work on worksheet #2-due tomorrow

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Classwork/Homework

Page 106 #3, 4a-h

Note: for #4 just solve each equation

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Equations with Fractions

Step #1: Clear all fractions by multiplying through by a number that all the denominators will divide into. Everything, including the non fraction terms must be multiplied by this number.

Step #2: Get like terms together by doing the opposite operation already being done. Get all the variables on one side and all the numbers on the other.

Step #3: Divide by the coefficient to get the variable alone.

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Example 3:

Example 3:

$$\frac{1}{3}(5x-1) + \frac{3}{2}(x+7) = 20$$

$$6 \cdot \left(\frac{5x}{3} - \frac{1}{3} + \frac{3x}{2} + \frac{21}{2} \right) = (20) \cdot 6$$

(3 and 2 can go into 6, so multiply all terms by 6)

$$\frac{30x}{3} - \frac{6}{3} + \frac{18x}{2} + \frac{126}{2} = 120$$

Simplify

$$10x - 2 + 9x + 63 = 120$$

Combine like terms

$$19x + 61 = 120$$
$$-61 \quad -61$$

subtract 61 from both sides

$$\frac{19}{19}x = \frac{59}{19}$$

Divide by 19 on both sides

$$x = \frac{59}{19} = 3\frac{2}{19}$$

Reduce the fraction.

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Solve each of the following:

- $3x + 2 = 8$
- $4 = 2(x-5)$
- $3x - 7 = -1$
- $4x + 3.5 = 7.5$
- $3(m - 2/3) = 25$
- $\frac{3}{5}(x+1) - \frac{1}{5}(x+2) = 15$
- $\frac{2}{3}x + \frac{1}{4} = \frac{3}{5}$

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Classwork/Homework

Page 107 #8 Solve each equation

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Steps for Solving Problems using an Equation

- Step 1: Identify the variables
- Step 2: Let letters represent each variable (write your statement "let $x = \dots$ ")
- Step 3: Write the equation using the variables
- Step 4: Put in known variable
- Step 5: Do the math!!! Put the unknown variable all by itself.

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Focus D: Solving Problems Pg. 108

Question:

The student council rented a bus to take fans to the basketball championship game.

- The basic cost to rent the bus is \$300
- The driver charges an additional \$1.50 per kilometer.
- The total bill was \$438

How far did the bus travel?

Solution:

1. Set up an equation:

Let " d " represent the number of kilometers traveled.

total cost = initial value + \$1.50 for each additional kilometer

2. Fill in and solve the equation:

$$y = 300 + 1.50d$$

$$438 = 300 + 1.50d$$

Subtract 300 from each side

$$138 = 1.50d$$

Divide by 1.50

$$92 = d$$

3. Check your answer:

Left-side

$$438$$

Right-side

$$300 + 1.50d$$

$$= 300 + 1.50(92)$$

$$= 438$$

$d = 92$ is correct!

The bus traveled 92 kilometers.

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Classwork/Homework

- Page 109 #11, 12, 13
- For each of the questions do the following:
 - write the equation that models the situation
 - state what quantity each variable represents
 - solve the equation
 - verify each solution

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Attachments

Equations.doc

Equation Riddles.doc

Solving for an Unknown 1.doc

Solving for an Unknown 2.doc

Word Problems Practice.doc

Writing word problems.doc